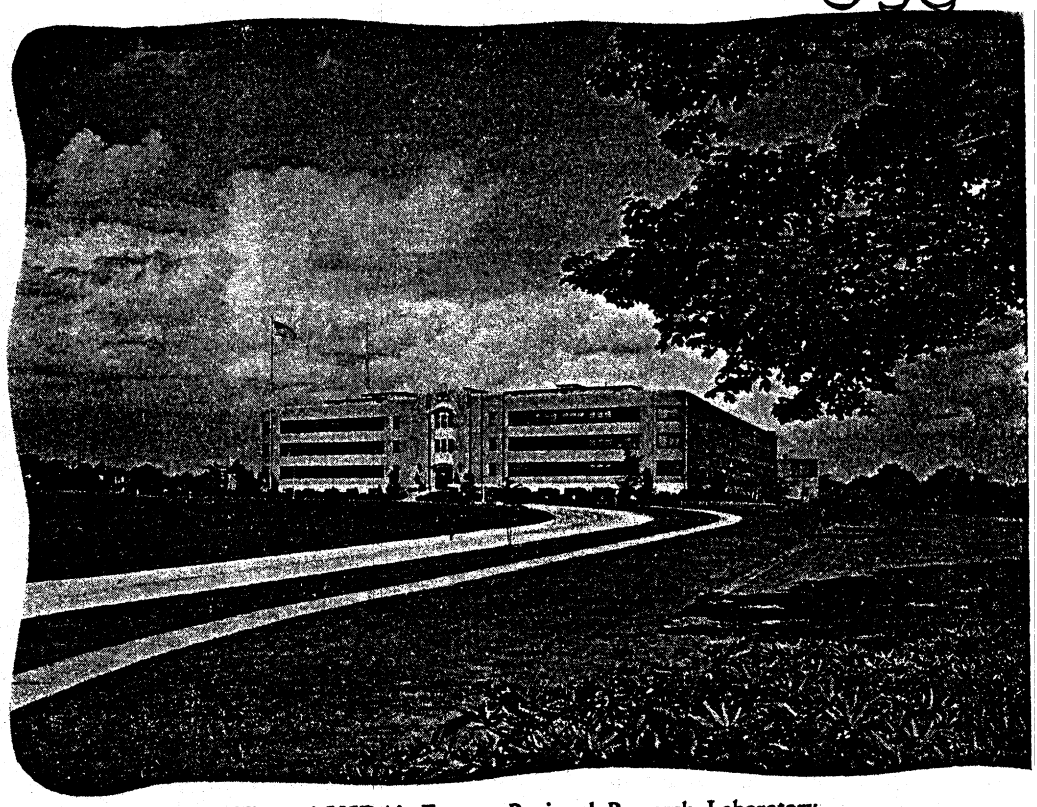

View of USDA's Eastern Regional Research Laboratory.

Buckwheat IS NOW Important to Medicine

by James F. Couch

HAS THE ELUSIVE and long-sought vitamin P finally turned up in buckwheat?

This question has intrigued chemists and medical scientists ever since rutin was extracted—first from tobacco, then from buckwheat—by chemists at the Eastern Regional Research Laboratory. A unit of the U. S. Department of Agriculture, this laboratory is located at Wyndmoor, Pa., a suburb of Philadelphia.

Seeking to discover all the commercially valuable constituents of the "smokers' weed," the researchers isolated several chemicals. Among them was rutin, a compound widely distributed in the plant kingdom and known to scientists for a century or more. A pigment glucoside, rutin was little more than a scientific curiosity and a practical use had never been found for it.

Pondering the chemical facts available about rutin, and still looking for some clue to a possible use, we envisioned the possibility that the substance might possess certain medical properties. Specifically, we wondered if it might be effective in treating certain diseases where minute hemorrhages occur.

The existence of such a substance had been claimed many years before by a Hungarian biochemist, Albert Szent-Györgyi, when he observed certain medical benefits obtained by using extracts of citrus fruits and red peppers. European chemists undertook extensive research in an attempt to discover the compound responsible for this action, which Szent-Györgyi named "vitamin P." The chemists failed to isolate the new curative agent, but did obtain a good deal of information concerning its probable nature and chemical relationships.

Effect on Patients Studied

The chemical relationships of rutin were similar to these, and this strengthened our belief that rutin might have the vitamin P action. The next step was to try rutin on animals and thereby test its activity. Unfortunately, there was no satisfactory method for using laboratory animals in these tests. It was necessary to study the effect of rutin on men and women suffering from those diseases which vitamin P seemed to benefit.

These studies were undertaken by Dr. John Q. Griffith, Jr. and Dr. M. A. Lindauer, two physicians at the Medical School of the University of Pennsylvania. They were primarily interested in the weakened capillaries associated with high blood pressure, a condition that sometimes results in hemorrhages in the brain or retina.

These scientists were acquainted with Szent-Györgyi's work and had previously used a citrus extract containing vitamin P. After 2 years of careful study involving a large number of patients, the physicians concluded that rutin actually is effective in such cases. Being a chemical compound and thus capable of standardization, it was preferable, they said, to extracts of unknown potency.

Rutin Strengthens Blood Vessels

The original publication announcing the effectiveness of rutin in restoring weakened capillaries to normal strength was followed by other medical reports describing beneficial results. Most of these dealt with conditions of hemorrhage. These reports led to an increased demand for rutin by physicians who wished to try it in their practice. For a time the supply of the drug was very short, but eventually a number of

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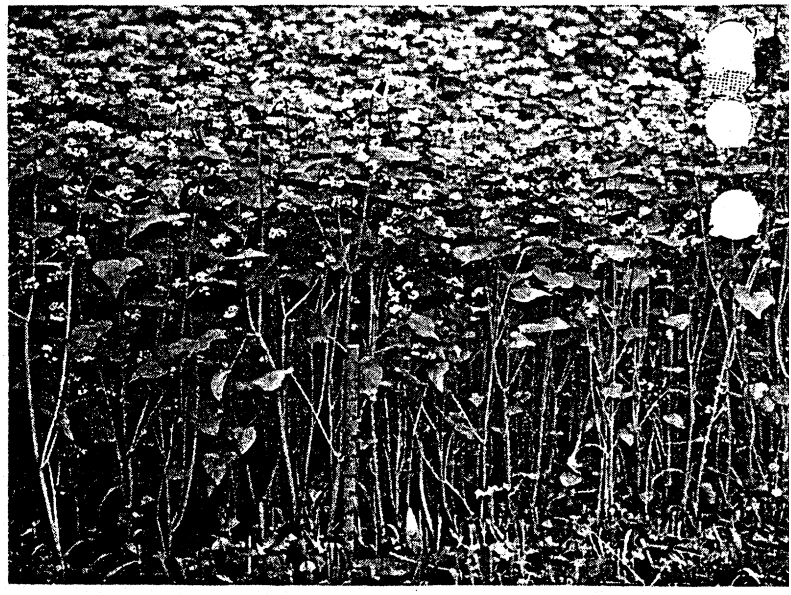
(Above) Field of Tartary buckwheat (Fagopyrum tataricum), a variety that has proved to be an excellent source of the new drug rutin. Agronomists are recommending it to Eastern growers.



Shown above is an excellent stand of Japanese buckwheat, an improved variety of the common buckwheat that is widely grown for grain. It has much larger flowers than the Tartary buckwheat, and is famed as a honey plant. USDA photos by M. C. Audsley.

pharmaceutical manufacturers became interested in the compound, and small quantities of rutin began to appear on the market.

Tobacco Too Expensive

It soon appeared that tobacco was unduly expensive as a raw material from which to prepare the drug. Fair yields could be obtained only from high quality leaf, which was priced at 60 to 75 cents per pound and yielded only 0.4 percent rutin. Factory wastes and low-priced leaf contained so little rutin as to be of no value for this purpose.

In the hope that a better source than tobacco might be found, a careful survey was made, testing all potential plant sources for their rutin content. After several months of effort in the laboratory, we obtained samples of the buckwheat plant, analyzed them, and found the answer. The freshly collected buckwheat plant contained vastly more rutin than tobacco, and it could be obtained for a fraction of the cost. For the rutin obtained from a dollar's worth of buckwheat, we once figured that tobacco leaf costing nearly $125 would be required.

This discovery paved the way for the commercial production of rutin on an economical scale. However, before the drug could become an established article of commerce, many other problems required solution. For one thing, green plant material was available for only a short time each year. It was desirable to dry the buckwheat so that it could be stored for use throughout the year. But ordinary methods of dehydration only resulted in large losses of rutin. After 2 years of effort, this problem was successfully solved.

Processes of dehydration which minimized the loss of rutin were then made available to commercial firms. As the result of this work, five companies began dehydrating buckwheat for sale to manufacturers of rutin.

This development required the planting of additional acres of buckwheat to provide material for dehydration. The actual increase in acreage is not known definitely, but it is rather substantial. It has been estimated that 50,000 acres of buckwheat will eventually have to be grown for this purpose.

Rutin Found in Leaves

The leaves and blossoms of the plant are richest in the desired drug, so only a portion of the harvested plant is actually used. The grain, which is customarily used for pancake flour, contains no rutin.

Since there are several types and species of buckwheat, a research team was formed to find out which kind is most suitable for rutin production. Scientists from Pennsylvania State College and the Bureau of Plant Industry, Soils, and Agricultural Engineering cooperated with research men of the Eastern Regional Research Laboratory in tackling this problem.

Preliminary results indicate that, of the accessible types, Tartary buckwheat is superior as a rutin producer, and it is being recommended for cultivation.

Other problems concerned processes for the economical extraction of the drug from either fresh or dried buckwheat. Refining the crude material to a pure product acceptable as a medicinal compound had to be further developed. As such processes were worked out, manufacturers were encouraged to begin preparing rutin on a commercial scale.

At least 15 pharmaceutical companies are now producing rutin in quantity, and a still larger number are processing rutin into dosage forms, principally tablets, for sale through the drugstores on physicians' prescriptions. In addition, foreign manufacturers have entered the field, and rutin is now being prepared in England, France, Holland and China and possibly also in Sweden and Denmark.

The use of rutin by physicians in the United States and Canada appears to be on the increase. Reports of its successful use in various types of hemorrhage and related diseases continue to appear in the medical journals. It has stimulated renewed interest in the subject of vitamin P, and several pharmacologists have been investigating its action during the past 5 years.

The place of rutin in medical science now seems well established. As a result of agricultural chemical research, suffering humanity has another remedy available to lessen pain and conquer disease. END